



Weekly News

4 February 2022

Tender launched for H2 production plant at Grangemouth

INEOS has invited engineering design contractors to bid into a tender for a carbon-capture enabled hydrogen production plant at its Grangemouth refinery. Moving to low-carbon fuels, INEOS will burn hydrogen at the refinery's onsite power station, due commissioned in late 2023.

In excess of 1 million tonnes per year of CO₂ from the hydrogen plant at Grangemouth refinery will be sent directly offshore through existing gas pipelines to be permanently stored in rock formations deep below the North Sea.

"The carbon dioxide from this project will be routed to the Scottish Cluster's Acorn CO₂ transport and storage project in North-East Scotland," said Stuart Collings, CEO of INEOS Olefins & Polymers UK.



INEOS Grangemouth oil and petrochemical refinery, one of the largest of its kind in Europe

H2-ready onsite power plant

Determined to decarbonise, INEOS has already committed over £500 million on active projects across the Grangemouth site, including monies in a new hydrogen co-fired power station which is

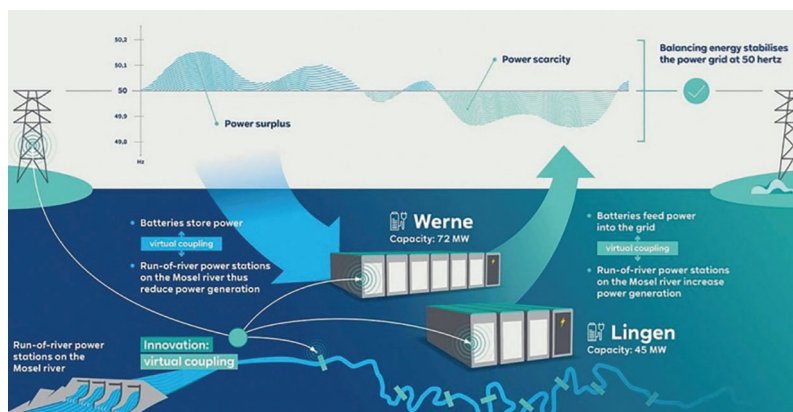
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RWE to grid-connect Germany's largest energy storage in late 2022

RWE gears up to commission one of Germany's largest battery storage systems (117 MW), installed at power plants in Lingen and Werne, before the end of this year. The batteries will be virtually coupled with RWE's run-of-river power stations along the river Mosel which raises the total energy storage capacity by another good 15%.

Build at a cost of €50 million, the integrated system comprises 420 lithium-ion battery racks. The energy storage unit at the Gersteinwerk power plant in Werne will have a capacity of 72 MW while the one at the Emsland power station in Lingen will have 45 MW.

What is special about the project is that the batteries are coupled with hydro power units. By raising or decreasing the flow-through at run-of-river power stations, RWE can make additional capacity



available, also as balancing energy.

RWE declined to disclose any information about the manufacturer of the energy storage units and

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due commissioned in the autumn of 2023.

By investing in a hydrogen production plant at Grangemouth, INEOS will be able to use the fuel directly for onsite power generation. Starting from next autumn, the new hydrogen-ready power plant will supply electricity to all site operations at the refin-

ery and lower emissions by at least 150,000 tonnes of CO₂ per annum. It will be converted to run fully on hydrogen at a later stage.

Locally produced hydrogen at Grangemouth will also be used to fuel the refinery's existing combined heat and power (CHP)

plant. KG Ethylene plant and assets in the Petroineos refinery. "This will require a new hydrogen distribution network throughout the site and modifications to the existing fuel gas network, all of which are captured within the scope of the engineering design," Collings explained. ■

Wintershall Dea starts storing CO₂ in Danish North Sea from late 2022

As a partner of Project Greensand, Wintershall Dea plans to start storing CO₂ in the Danish North Sea in the late autumn of this year. The pilot CCS project, backed by €26 million in Danish government funding, is being realised together with INEOS and Maersk Drilling.

CCS is a technology that allows to capture up to 90% of industrial carbon emissions at industrial sites and power stations onshore to be transported offshore for injection and storage beneath the seabed. Project Greensand currently validates the feasibility of permanent CO₂ storage in depleted oil and gas reservoirs in the Danish of the North Sea, starting with the Nini West Field. Ultimately, the aim is to scale up the entire site to 4-8 million tonnes of CO₂ per year, contributing to 25-40% of Denmark's carbon reduction target.

Wintershall Dea CEO Mario Mehren is convinced the CCS expertise in Danish waters should also be put to use in Germany. But the new coalition government in Berlin would first have to enact new regulation for safe offshore CO₂ storage – widely used already in neighbouring European countries.

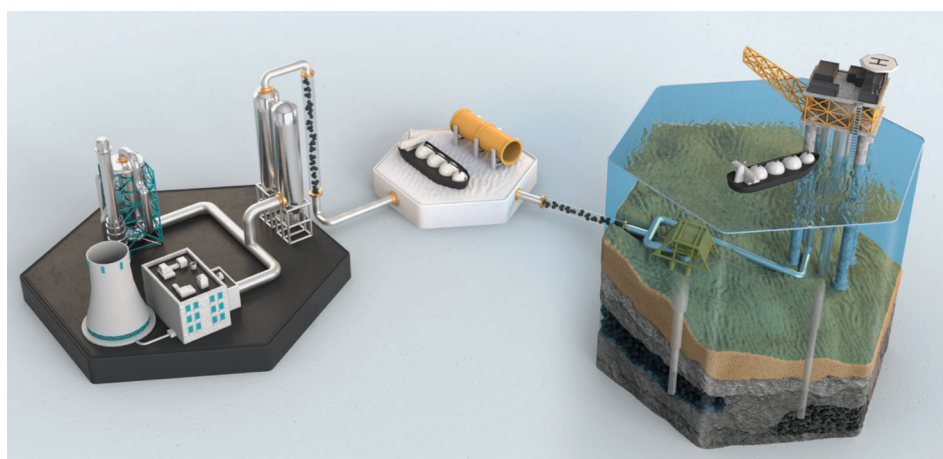
Policies need to embrace CCS and grey hydrogen

Though CCS is crucial for reducing emissions, but Mehren stressed "most importantly, Germany's new government must quickly set the course for its energy policies, especially when it comes to hydrogen and building new gas-fired power plants."

Grey hydrogen – H₂ made from natural gas – needs to be included in Germany's National Hydrogen Strategy to enable a rapid market ramp up, the Wintershall Dea CEO argues. According to the Germany Energy Agency (dena), demand for hydrogen will

increase more than tenfold by 2045, from today's 60 Terawatt-hours (TWh) to 657 TWh. Green hydrogen, made from renewables, will not suffice to meet this surge in demand hence grey hydrogen is vital to fill the gap in a transition period.

To source and import enough green fuel, Europe needs to speak with one voice, Mehren underlined: "Producers like Russia, Norway and North Africa view the EU as a key market and will certainly develop products that Europe wants and needs – whether climate-friendly gas or CCS." ■



Scheme for CCS off Denmark

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the exact applied storage technology. A spokesman pointed out that RWE has all the necessary expertise within the company – outstanding battery competency, a deep understanding of the market and many years of experience in operating power stations.

The Essen-headquartered company already operates battery storage systems in

the U.S., Germany and Ireland. Other large-scale projects are currently in the making, the spokesman indicated.

Apart from lithium-ion batteries, RWE is also engaged in projects with redox-flow storage systems and second-life batteries, i.e. the stationary use of former electric vehicle batteries. ■

Germany mulls strategic gas reserve to pre-empt risk of supply crisis

Germany's new government considers enacting minimum gas storage levels and a strategic reserve as storage facilities are only 40% full – far less than in previous years. Storage levels are very low across Europe as Gazprom deliberately lowered gas flows by 25% since November, sending prices soaring and forcing the EU to shield against a possible halt of all Russian imports.

Escalating military tensions at the border between Russia and Ukraine have raised concerns about gas flows to Europe. The International Energy Agency (IEA) sees strong elements of 'artificial tightness' in European gas markets, as Russia's state-controlled supplier Gazprom lowered export to Europe by more than a quarter since November 2021 and currently delivers one-third less than it could.

If Gazprom halts gas flows entirely, the

EU would need to step up LNG imports and impose emergency measures – like factory closures – to reduce demand. According to analysis by the think tank Bruegel, such a scenario would have "profound consequences for economy (and) imply difficult and costly decisions for Europe to orderly manage the situation."

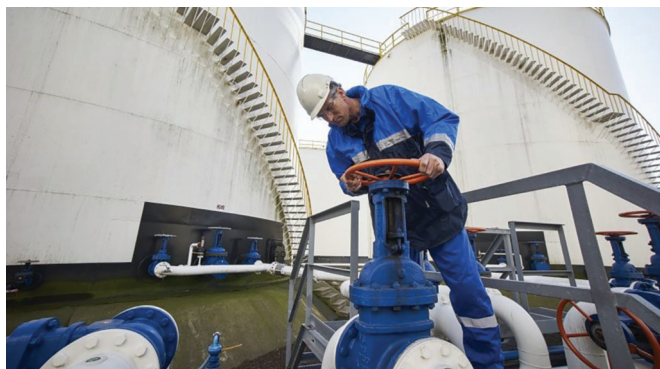
The EU depends on Russia for about 40% of its gas needs, though eastern European countries have a greater reliance on Russian gas than western Europe which can resort to importing LNG.

According to Bruegel findings, there is enough spare infrastructure to nearly replacing the volumes Europe imported from Russia in recent weeks. European LNG regasification terminals and unused pipeline capacity from Norway and North Africa could technically cover the 1,700 TWh of

gas Europe receives from Russia, based on 2021 data.

But Norway and Algeria may not be able to boost supplies swiftly enough and a jump in LNG demand would propel up prices, burdening the EU economy. In practice, it will be nearly impossible to divert enough LNG cargoes to Europe to make up for Russian pipeline gas supplies given limited global liquefaction capacity and producer's existing contracts to ship cargoes to Asian buyers.

Trying to play down the situation, the German economic ministry said security of supply was "guaranteed" and there were "currently no signs of supply bottlenecks." It is clear, however, that the government has to improve the possibilities for next winter and strengthen future gas supply provisions. On a European level, Brussels urgently needs to overhaul the EU's strategic gas storage policy and streamline regulation. Italy, Hungary and Austria already have strategies in place to supply the market in the event of a supply shortage, but others do not. ■



Turning on the taps on strategic gas storage.

Beware of political tensions from energy price spikes, IEA warns

Sharp spikes in electricity prices have hit businesses and households around the world which could cause political tensions, the head of the International Energy Agency (IEA), Fatih Birol warned. In Europe, wholesale electricity prices in Q4-2021 were more than four times their 2015-2020 average and gas shortages also propelled up prices in Japan and India.

To avert the risk of social unrest, the IEA head is urging policy makers to "take action now to soften the impacts on the most vulnerable and to address the underlying causes." Investment in low-carbon power generation, energy efficiency and nuclear power, in his view, can help get countries out of today's difficulties.

A rapid economic rebound from the pandemic pushed up global electricity demand 6% in 2021 – the largest rise in percentage terms since 2010 when the world was recovering from the global financial crisis. In absolute terms, last year's increase of over 1,500 terawatt-hours (TWh) was the largest ever recorded.

Blackouts due to fuel shortages

Around half of last year's global growth in electricity demand took place in China, where demand grew by an estimated 10%.

Supply shortages of natural gas and coal were leading to volatile prices. China and India suffered from backouts at certain points in the second half of the year as coal-fired power stations were running out of fuel. Home to a large, young and fast-growing population, India needs to ensure stable supply of electricity, water and petrol or risk social tensions.

For 2022-2024, the IEA anticipates electricity demand growing 2.7% a year on average, although ongoing pandemic and high energy prices bring some uncertainty to this outlook. Renewables energy contribution is forecast to grow 8% per year, while new nuclear power is seen to contribute 1%

of net demand growth.

Slower growth in power demand, combined with significant renewables additions, will make fossil-fuel based generation stagnate in the coming years. Coal power is on the way out in Europe and the US, but this is balanced by new-builds in China and India. Gas-fired generation, meanwhile, is seen growing by around 1% a year. ■



Consumers pay dearly for electricity

EU makes it easier for gas power plants to get 'green investment' label

The European Commission has published final taxonomy rules, changing criteria to make it easier for gas to earn a green investment label. The draft required new plants to co-fire low carbon gases by 2026 and switch to 100% green fuels in 2035, but the 2026-rule will now be lifted.

Another stringent rule in the draft taxonomy rule that new gas power plants replace a more polluting plant and achieve a 55% emissions reduction per kWh of energy unit has also been watered down. The actual 55% reduction is now applied to the plant's overall lifetime – so dirtier plants can be included on the promise to be retrofitted and decarbonised later.

Getting gas plants hydrogen-ready

The initial proposal only classified gas as "green" until 2030 when plants adhere to firm emissions thresholds. Not only do direct greenhouse gas emissions need to be below 270 grams per kWh of energy output, the plant's annual emission is also not permitted to exceed 550 kilograms of CO₂e/kW

of energy output over 20 years.

Basically, new-built gas power units are only considered sustainable if they replace coal power units, and operators need to demonstrate that the turbines be adapted to co-fire green fuels like ammonia and hydrogen.

Taxonomy could take effect from 2023

The relaxed rules were adopted by the Commission on Wednesday this week. With the final proposal published, it could take effect as early as January 2023, unless vetoed by a supermajority of EU member states.

Four countries urged the Commission on Monday to exclude gas, citing a "lack of sci-

entific evidence" to label this fossil fuel as green. Others adamantly oppose new nuclear – like Austria and Luxemburg which threatened legal action if the EU classifies nuclear as sustainable.

But the scheme can only be stopped if at least 20 EU countries – out of the total 27 – oppose it, which is unlikely. France and Poland want new small-scale nuclear reactors and Germany more flexible gas generation. ■



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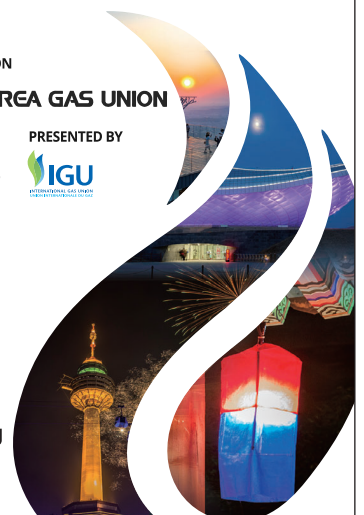
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PG&E proposes nine energy storage projects in California

Pacific Gas and Electric Company (PG&E) has filed to the regulator proposing to add nine battery energy storages with a combined capacity of 1,600 MW/6,400 MWh. All based on lithium-ion technology, the nine projects would bring PG&E's total energy storage capacity to more than 3,330 MW by 2024.

The large-scale projects would be grid-connected starting from 2023 and participate in the California Independent System Operator (CAISO) markets, providing energy and ancillary services. The staggered start-up is timed to give CAISO enough operating reserve as PG&W's 2.2 GW Diablo Canyon nuclear plant will reach the end of its lifetime in 2025, as well as 3.7 GW of gas-fired power plants.

Striving to avert a supply crunch, the regulator – California Public Utilities Commission (CPUC) – in June 2021 mandated all of the state's load-serving entities to procure a total of 11.5 GW of new resources. At least 2,500 MW of the new capacity must be from zero-emission electric generation resources, generation resources paired with storage, or demand response.

In total, PG&E is responsible for purchasing at least 2,302 MW to be delivering energy to the grid between 2023 and 2026. The utility's proposed nine energy storage projects will fulfill parts of the requirements, and PG&E announced it will issue another (phase two) competitive solicitation later this year for resources to be delivering energy by June 1, 2025 and June 1, 2026.

The latest nine li-ion energy storage projects, each with 4-hours discharge duration, are:

- Beaumont ESS I, (a wholly owned subsidiary of Terra-Gen) – The Beaumont Energy Storage project is comprised of a 100 MW stand-alone, transmission-connected battery energy storage resource located in Beaumont, Calif. (Riverside County) and scheduled to be online by August 2023.
- Sanborn ESS I, (a wholly owned subsidiary of Terra-Gen) – The Edwards Sanborn Energy Storage project is comprised of a 169 MW stand-alone, transmission-connected battery energy storage resource located in Mojave, Calif. (Kern County) and scheduled to be online by August 2023.
- Canyon Country ESS I, (a wholly owned subsidiary of Terra-Gen) – The Canyon Country Energy Storage project is comprised of an

80 MW stand-alone, transmission-connected battery energy storage resource located in Santa Clarita, Calif. (Los Angeles County) and scheduled to be online by October 2023.

- Moss Landing Energy Storage 3, (a wholly owned subsidiary of Vistra Corp) – The MOSS350 Energy Storage project is comprised of a 350 MW stand-alone, transmission-connected battery energy storage resource located in Moss Landing, Calif. (Monterey County) and scheduled to be online by August 2023.
- Poblano Energy Storage, (a wholly owned subsidiary of Strata Clean Energy) – The Inland Empire Energy Storage project is comprised of a 100 MW stand-alone, transmission-connected battery energy storage resource located in Rialto, Calif. (San Bernardino County) and scheduled to be online by April 2024.
- NextEra Energy Resources Development, (a wholly owned subsidiary of NextEra Energy Inc.) – The Corby Energy Storage project is comprised of a 125 MW stand-alone, transmission-connected battery energy storage resource located in Vacaville, Calif. (Solano County) and scheduled to be online by June 2024.
- NextEra Energy Resources Development, (a wholly owned subsidiary of NextEra Energy Inc.) – The Kola Energy Storage project is comprised of a 275 MW stand-alone, transmission-connected battery energy storage resource located in Tracy, Calif. (Alameda County) and scheduled to be online by June 2024.
- Nighthawk Energy Storage, (an affiliate of Arevon Energy) – The Nighthawk Storage project is comprised of a 300 MW stand-alone, transmission-connected battery energy storage resource located in Poway,

Calif. (San Diego County) and, pending required local approvals, is scheduled to be online by June 2024.

- Caballero CA Storage, (a wholly owned subsidiary of Origis USA) – The Caballero Energy Storage project is comprised of a 99.7 MW stand-alone, transmission-connected battery energy storage resource located in Nipomo, Calif. (San Luis Obispo County) and scheduled to be online by June 2024.

PG&E has executed 15-year Resource Adequacy agreements for each of the nine projects. In addition, the utility aims for an additional 1,100 MW of storage capacity (of the 3,330 MW contracted) to come online in 2022 and 2023 including PG&E's Elkhorn Battery – a 182.5 MW BESS comprised of Tesla Megapacks – which is anticipated to be operational before summer 2022. ■

NEWS NUDGES

Georgia Power shifts to cleaner fuels

Striving to lower its carbon footprint, Georgia Power has proposed to the state regulator to retire 3,500 MW of coal-fired generating capacity by 2028. In return, it wants to add 2,356 MW of gas-fired power generation capacity as well as 6,000 MW of wind power and solar PV by 2035.

B&W wins \$6m gas conversion contract

Babcock & Wilcox (B&W) has been awarded a contract for more than \$6 million to convert a Middle East chemical plant's six boilers from oil to lower-emission fuel. B&W's Thermal segment will design, manufacture and supply dual-fuel burners, main and local gas skids and provide commissioning services.

McDermott launches carbon footprint calculator

McDermott International has launched ArborXD, a web-based tool that collects data, estimates and reports on the potential carbon impact of an energy infrastructure project – before construction begins. Embedded as early as the design phase, the carbon calculator gives customers access to cost trade-off analyses, emission reduction pathways and environmental impact assessments. ■



Render of PG&E's Sanborn project Kern County, California

SEWA starts trial run of 345 MW gas power unit in Sharjah, UAE

Sharjah Electricity, Water and Gas Authority (SEWA) is undertaking trial runs of the first 345 MW unit within the Al Layyeh power plant expansion. A second, equally-sized unit, will be built and commissioned by January 2023 – both powered by M701F gas turbines.

For the Al Layyeh expansion, SEWA liaised since 2018 with an alliance of Mitsubishi and Elsewedy Electric. Works have been impacted by the pandemic and the total cost of the power plant expansion is now expected to amount to over \$544.5 million.

The project's scope of supply consists of two M701F gas turbines with 345MW each, two heat recovery boilers, and a 336 MW steam turbine with a combined total efficiency of more than 60% of the overall capacity.

Since November 2021, SEWA engaged another contractor to supervise and ensure the quality of works as it strives to get the two new units commissioned early next year. With a capacity of 1,026 MW, the

expansion project is envisaged to ensure grid stability and uninterrupted electricity supply in the emirate of Sharjah.

Saeed Sultan Al Suwaidi instructed SEWA to swiftly expand its power generation capacity to keep pace with the rapid industrial and commercial development of the emirate. The government hence set a target of 4,600 MW installed capacity by 2030, and urges operators to retrofit their power stations to reach over 60% operational efficiency. ■



SEWA's Al Layyeh power plant expansion

Siemens receives 7th HL-class turbine order from South Korea

Siemens Energy has bagged its seventh HL-class turbine order from South Korea where the equipment will be used to power the 571 MW Eumseong combined-cycle plant. The client is Korea East-West Power, part of KEPCO, which builds the CCGT in replacement of a previously planned 1,000 MW coal power plant. The new plant is due to be commissioned in late 2024.

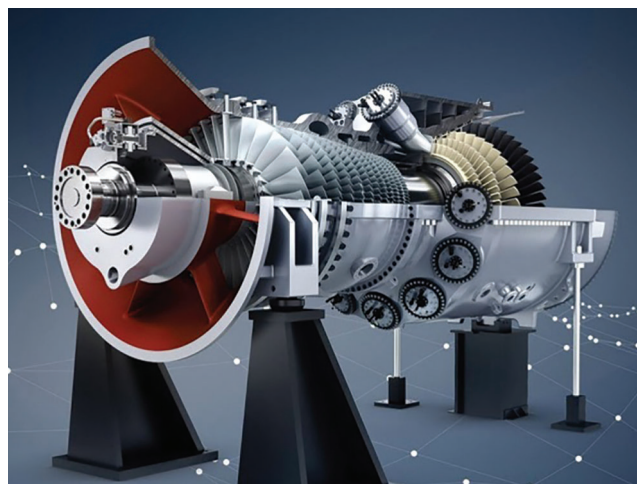
The fuel switch of Korea East-West Power comes in response to a change in the South Korean government's environmental policy. The switch to a modern high-efficiency gas-fired power plant will reduce CO₂ emissions by up to 3.7 million tons per year compared to a similar coal power plant.

Eumseong CCGT will be the first of two equally-sized units, each with 571 MW

installed capacity. The plant is designed as a single-shaft unit that will operate on regasified LNG.

POSCO Engineering & Construction, an EPC specialist which has completed numerous projects with Siemens Energy in South Korea in the past, will be responsible for building the entire plant.

Siemens Energy's scope of supply includes a SGT6-9000HL gas turbine, a SST-5000 steam turbine, a SGen-3000W generator, and the SPPA-T3000 control system. The order also includes a long-term part management contract for the gas turbine, technical field advisory, and digital services including diagnostics, continuous performance optimization, and compressor condition monitoring. The aim is to improve asset utilization, reliability, and availability while also reducing operating and maintenance costs. ■



Siemens HL-class gas turbine

Wärtsilä decarbonises gold mine power station in Suriname

Wärtsilä will supply a 7.8 MW/ 7.8 MWh energy storage system to a gold mining company in Suriname to improve the efficiency of the mine's onsite power station. Energy storage reduces the need for emergency back-up spinning reserve, therefore lowering fuel consumption. The facility is planned to start operations in late 2022.

The order, booked in the fourth quarter of 2021, will be Wärtsilä's first energy storage project in Suriname and also the country's first unit of this kind.

The project is estimated to reduce the mine's emissions by 5,600 metric tonnes of CO₂ equivalent per year. Adding storage will help optimise power plant operations, across the lifetime of the gas engines.

The facility will include GridSolv Quantum, Wärtsilä's integrated, modular and compact energy storage system, as well as the GEMS energy management system. GEMS will control and optimise operations of the fossil power plant as well as the new energy storage with the aim of integrating renewable energy sources to further decarbonise mining operations. ■



Rosebel gold mine in Suriname

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